tire vertebral body(VB) was part of target volume in all patients. The IMPT plan was generated using 3 fields with single field optimisation technique. Last 5 patients were treated using dose gradient(DG) (98-93%) deliberately created in anterior most 3-5mm of VB. Initial 2 patients were treated with intention of covering entire VB with 98% isodose. Monte Carlo algorithm was used for dose calculations and optimisation, and robustness assessed for 3mm setup and 3.5% range uncertainty. RESULTS: The CSI dose ranged from 21.6GyE to 35GyE. In patients without DG, maximum and mean dose to esophagus(36.67GyE vs. 25.45GyE, 31.53GyE vs. 20.41GyE), midline mucosa(28.95GyE vs. 25.31GyE, 21.8GyE vs. 14.61GyE) and bowel bag(32.9GyE vs. 24.27GyE, 3.59GyE vs. 3.21GyE) were higher compared to patients with DG. Both patients where DG was not created, developed grade 2 esophageal toxicities requiring supportive care and treatment interruptions(4 and 2days). All 5 patients with DG did not develop significant esophageal toxicity and had no interruptions. CONCLUSION: Creating a dose gradient over anterior VB using IMPT reduces dose to esophagus and midline mucosa leading to lower acute esophageal toxicity which potentially avoids treatment interruptions during CSI.

RONC-24. PROTON THERAPY FOR PEDIATRIC EPENDYMOMA: MATURE OUTCOMES FROM THE UNIVERSITY OF FLORIDA AND MASSACHUSETTS GENERAL HOSPITAL

Daniel J Indelicato[1], Myrsini Ioakeim-Ioannidou[2], Julie Bradley[1], Raymond Mailhot-Vega[1], Christopher Morris[1], Nancy Tarbell[2], Torunn Yock[2], and Shannon MacDonald[2]; [1]University of Florida, Jacksonville, FL, USA, [2]Massachusetts General Hospital, Boston, MA, USA

OBJECTIVE: Report long-term efficacy and toxicity of proton therapy for pediatric ependymoma. MATERIALS AND METHODS: Between 2000–2017, 318 children with nonmetastatic grade II/III intracranial ependymoma received proton therapy at Massachusetts General Hospital and the University of Florida. Median age was 3.5 years (range, 0.7–21.3 years); 56% were male. Most (69%) tumors were in the posterior fossa and classified as WHO grade III (64%). Eighty-four percent had a gross total or near total tumor resection before radiotherapy and 30% received chemotherapy. Median radiation dose was 55.8 CGE (range, 50.4–59.4 CGE). RESULTS: Median follow-up was 6 years (range, 0.6–19.2 years). Seven-year local control, progression-free survival, and overall survival rates were 77.1% (95% CI 71.7–81.7%), 64.4% (95% CI 58.6–69.8%), and 82% (76.9–86.2%), respectively. Subtotal resection was associated with inferior local control (60% vs 80%; p<0.01), progression-free survival (49% vs 67%; p<0.01), and overall survival (69% vs 84%; p<0.05). Male gender was associated with inferior progression-free (59% vs 71%; p<0.01) and overall survival (77% vs 89%; p<0.05). Twenty patients (6.2%) require hearing aids; of these, 12/20 received cisplatin. Grade 3+ brainstem toxicity rate was 1.6% and more common in patients who received >54 CGE. The rate of second malignancy was 0.9%. CONCLUSION: Proton therapy offers commensurate disease control to modern photon therapy without unexpected toxicity. The high rate of long-term survival justifies efforts to reduce radiation exposure in this young population with brain tumors. Independent of modality, this large series confirms extent of resection as the most important modifiable factor for survival.

RONC-25. A CASE OF PEDIATRIC PONTINE GLIOMA TREATED WITH GAMMA KNIFE SURGERY

Satoshi Kaneko[1], Juri Kiyokawa[1], Shin Hirota[1], Yasuhiro Murota[1], Mariko Ishikawa[1], Hiroto Yamaoka[1], Masataka Yoshimura[1], Masaaki Yamamoto[2], and Shinji Yamamoto[1]; [1]Tsuchiura Kyodo General Hospital, Tsuchiura, Ibaraki, Japan, [2]Mito Gamma House, Hitachinaka, Ibaraki, Japan

BACKGROUND: Pediatric brainstem gliomas rarely occur and are a heterogeneous group of diseases, which increases the difficulty of treatment strategy. Here, we present a case of pediatric pontine glioma treated with Gamma Knife surgery (GKS) after open biopsy. CASE DESCRIPTION: An 11-year-old boy presented with diplopia due to the left MLF syndrome. MRI showed a well-circumscribed, protruding tumor with partial gadolinium enhancement in the dorsal pons. An open biopsy was performed via the suprafacial triangle following midline suboccipital approach. Histological examinations revealed high cellularity and mild atypia. Immunohistochemistry demonstrated positive stain for GFAP and Olig2 antibodies, and negative for p53 protein. The Ki67-labeling index was 6.8%. Pyrosequence analysis indicated IDH1/2 wild type (wt), BRAF V600 wt, H3F3A K27 wt, FGFR1 wt, and TERT wt. The final diagnosis was pediatric diffuse astrocytoma, WHO grade II, pons. GKS was performed one month after the biopsy. After transient worsening of the symptom, it disappeared gradually. The tumor is stable for three years with mild shrinkage of the size. DISCUSSION: Gross total resection (GTR) of pediatric low-grade, brainstem gliomas may result in a good prognosis. However, unlike pilocytic astrocytoma, diffuse astrocytoma is not easy to perform GTR without any complications. There are some reports regarding GKS for brainstem gliomas, which prove an increase in progression free survival rate. No marked tumor regression is achieved in our case, but tumor growth is well-controlled so far. CONCLUSION: GKS after biopsy can be a useful treatment option for pediatric low-grade brainstem gliomas.

RONC-26. A CASE OF RADIATION NECROSIS OF THE CEREBELLUM 16 YEARS AFTER CHEMORADIOTHERAPY FOR MEDULLOBLASTOMA

Mayuko Miyata, Masahiro Nonaka, and Akio Asai; Department of Neurosurgery, Kansai Medical University, Hirakata City, Osaka, Japan

BACKGROUND: If new lesions are observed during follow-up of the malignant tumor after treatment, it is difficult to distinguish whether the tumor is a recurrent lesion, secondary cancer, or radiation necrosis of the brain. We have encountered a patient with symptomatic radiation necrosis of the cerebellum 16 years after treatment of medulloblastoma. CASE PRESENTATION: A 24-year-old man who had received a tumor resection and chemoradiotherapy for cerebellar medulloblastoma at the age of 8 presented with dizziness. For the past 16 years, there was no recurrence of the tumor. He subsequently underwent MRI scan, and T1-Gd image showed enhanced lesion in the right cerebellar peduncle. Cerebrospinal fluid cytology analysis was negative for tumor. We suspected tumor reccurence or secondary cancer, and performed lesion biopsy. The result of the pathological examination was radiation necrosis of the cerebellum. DISCUSSION: The interval of radiation necrosis of the brain and radiotherapy can vary from months to more than 10 years. So, whenever a new lesion is identified, radiation brain necrosis must be envisioned. According to guidelines in Japan, there is no absolute examination for discriminating tumor recurrence from radiation brain necrosis and diagnosis by biopsy may be required. CONCLUSION: We experienced a case of symptomatic radiation necrosis of the cerebellum 16 years after treatment. In patients showing new lesion after long periods of time, the possibility of radiation necrosis to be considered.

RONC-27. PROTON THERAPY REDUCES DOSE TO CRITICAL CENTRAL NERVOUS SYSTEM STRUCTURES IN MEDULLOBLASTOMA: A DOSIMETRIC ANALYSIS OF CHILDREN'S ONCOLOGY GROUP (COG) ACNS0331

Matthew Deek[1], Matthew Ladra[1], Lan Lin[1], Yimei Li[2], Yuanyuan Han[2], Kristina Hardy[3], and Jeff Michalski[4]; [1]Johns Hopkins Hospital, Baltimore, MD, USA, [2]St. Jude Children Hospital, Memphis, TN, USA. [3]Childrens National, Washington DC, USA.,[4]Washington University in St. Louis, St. Louis, MO, USA

BACKGROUND: Recently published data demonstrated proton therapy (PRT) significantly reduced cognitive decline relative to photons for pediatric medulloblastoma. These findings imply that reductions in dose to critical CNS structures during the boost phase may account for better outcomes over time. Here, we examine differences in dosimetric data for medulloblastoma patients treated on ACNS0331 with photon (Intensity Modulated Radiation Therapy, 3D-Conformal Radiation Therapy) vs PRT to identify potential structures responsible for cognitive benefit. METHODS: COG ACNS0331 was a randomized trial examining the impact of reduced craniospinal irradiation (CSI) dose (standard vs low dose, in patients aged 3–7) and volume (whole posterior fossa vs involved field) in pediatric medulloblastoma patients. We identified 136 patients (IMRT=95, 3DCRT=28, Proton=13) enrolled on ACNS0331 with complete radiation and imaging data and re-contoured 10 critical brain structures to calculate dose. RESULTS: Proton therapy significantly reduced the dose to critical structures. For example, temporal lobe mean dose and V30 were 30Gy/38% (PRT), 40Gy/89% (IMRT), 41Gy/84% (3DCRT)), hippocampi mean dose were 51 Gy (IMRT), 52 Gy (3DCRT), and 44Gy (PRT) and cochlear mean dose were 43 Gy (IMRT), 49 Gy (3DCRT), and 31Gy (PRT). Dose to several other critical structures were also significantly reduced including the whole brain, supratentorium, cerebellum, and pituitary. CONCLUSIONS: Proton therapy greatly reduces dose to critical CNS structures when compared to IMRT or 3DCRT. Further studies are needed to correlate dose reductions in these structures with improved cognitive outcomes.

RONC-31. ADVANCED ECHOCARDIOGRAPHY WITH MYOCARDIAL-STRAIN-ANALYSIS DESCRIBES SUBCLINICAL CARDIAC DYSFUNCTION AFTER CRANIOSPINAL IRRADIATION (CSI) IN PEDIATRIC AND YOUNG ADULT PATIENTS WITH CENTRAL NERVOUS SYSTEM (CNS) TUMORS

Hugo Martinez, Ralph Salloum, Erin Wright, Philip Khoury, Justin Tretter, and Thomas Ryan; Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA

CSI is part of the treatment of CNS tumors and is associated with cardiovascular disease; data in pediatric/young-adult patients are limited. Myocardial-strain-analysis can reveal subclinical dysfunction. Retrospective,